

Physical Habitat and Water Quality Criteria For Fall Chinook Salmon Associated With the Hells Canyon Complex (E. 3.1-3, Chapter 2)

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I. Introduction

The purpose of this study is to develop habitat parameters needed to accurately model and estimate habitat availability for a given life history stage of fall chinook salmon.

Previous studies lacked adequate criteria for modeling spawning habitat use by fall chinook salmon. Because the historical criteria could be interpreted various ways, the results from any modeling efforts would be difficult to analyze. This uncertainty emphasized the need for developing appropriate values for the principal habitat attributes before proceeding with a modeling process.

In this study IPC specifically sought to describe the distribution of depth, mean water column velocity, substrate-level water velocity, surficial-substrate particle size, dissolved oxygen, and temperature that spawning fall chinook salmon need. These attributes were of particular interest because of their utility for instream flow modeling.

This study uses peer-reviewed literature to develop appropriate criteria for describing the habitat of incubating and rearing fall chinook salmon within the Snake River downstream of the HCC.

II. Conclusions

1. "IPC biologists developed chinook salmon criteria curves that can help describe habitat suitability downstream of the HCC. These curves can apply to various operational scenarios and protection mitigation, or enhancement measures for adult migration and spawning, as well as juvenile rearing and migrations.... [The criteria are as follows]:

- 1. Suitable temperature for migrating adult chinook is from 1 to 8 °C, as well as 15 to 21 °C.*
- 2. Optimal temperature for migrating adult chinook is between 8 and 15 °C.*
- 3. Suitable temperature for spawning fall chinook is from 5 to 10 °C, as well as 15 to 31 °C.*

4. *Optimal temperature for spawning fall chinook is between 10 and 15 °C.*
5. *Suitable temperature for rearing fall chinook is from 1 to 10 °C, as well as 15 to 21°C.*
6. *Optimal temperature for rearing fall chinook is between 10 and 15 °C.*
7. *Suitable temperature for migrating juvenile chinook is from 1 to 8 °C, as well as 15 to 21 °C.*
8. *Optimal temperature for migrating juvenile chinook is between 8 and 15 °C.*
9. *For all stages, optimal DO levels are above 76% saturation at temperatures of 16 °C or lower.*
10. *For all life stages, suitable DO levels are between about 40 and 76% saturation when temperatures are 16 °C or lower.*
11. *At higher temperatures, DO requirements increase for both optimal and suitable levels.*
12. *Physical habitat requirements for spawning fall chinook salmon include depths between 0.2 and 6.5 m, mean water-column velocities between 0.6 and 1.7 m/s, and substrate sizes between 2.6 and 15.0 cm long axis length.*
13. *Physical habitat requirements for rearing fall chinook salmon include areas within the littoral zone to depths of 1.5 m, and having substrates of less than 22.5 cm long axis length, mean water-column velocities less than 0.4 m/s, and lateral shoreline slopes less than 40%.” (Page 15-16, Paragraph 2)*

Response: The BLM agrees with these findings. It is recognized that there may be some variability within these parameters, but they represent a synthesis of best available knowledge for modeling flow scenario impacts on fall chinook salmon life stages.

III. Study Adequacy

The study meets the objectives and is adequate.

IV. BLM Conclusions and Recommendations

Conclusions

The field studies by IPC and a thorough review of available peer-reviewed literature provide a set of parameters that can be used to model fall chinook salmon behavior at all life stages in the Snake River below the Hells Canyon Dam. The study provides specific criteria for habitat variables known to affect fall chinook salmon from egg through adult stage. The information is state-of-the-art and should be adequate to model fall chinook salmon behavior associated with HCC flow scenarios.

Recommendations

The study is adequate and no additional studies should be required.